

APRIL/MAY 2024

23PPH23 — ELECTROMAGNETIC THEORY

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State spherical polar coordinates.
2. Define electrical susceptibility.
3. Write down the expression for magnetic vector potential.
4. What is meant by boundary conditions of the vector field?
5. Write down expression for Maxwell equation.
6. Define Lorentz force.
7. What is meant by linear polarization?
8. What is meant by oscillating electric dipole?
9. What are the advantages of electron plasma oscillations?
10. Differentiate Alfvén's waves and Magneto sonic waves.



PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Obtain the uniqueness theorem in boundary conditions.

Or

- (b) Derive the expression for electrostatic energy in presence of dielectric filed.

12. (a) State and explain Biot-Savart law.

Or

- (b) Discuss the Magneto static energy and energy density.

13. (a) Explain faraday's laws of induction.

Or

- (b) Derive the expression for Poynting theorem.

14. (a) Derive the expression for plane wave equation in non-conducting media.

Or

- (b) Explain in details radiation from a localized source.

15. (a) Derive the expression for Magneto-hydro-dynamic equation

Or

- (b) Write a short note on Electron plasma oscillator.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Obtain the expression for dielectric sphere in a uniform filed.

17. Prove the Magnetic induction B can be represented as the negative gradient of a scalar function ϕ_m .

18. Explain the covariant form of Lorentz force law.

19. Obtain the expression for propagation of waves in rectangular wave-guides.

20. Describe in detail about Debye Shielding Problem.

